

## DRG-Based CubeSat Inertial Reference Unit (DCIRU), Phase I

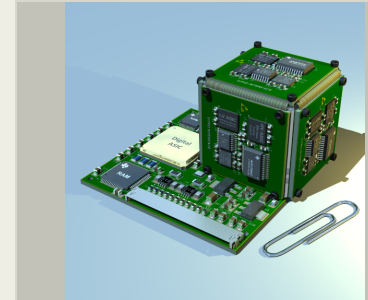
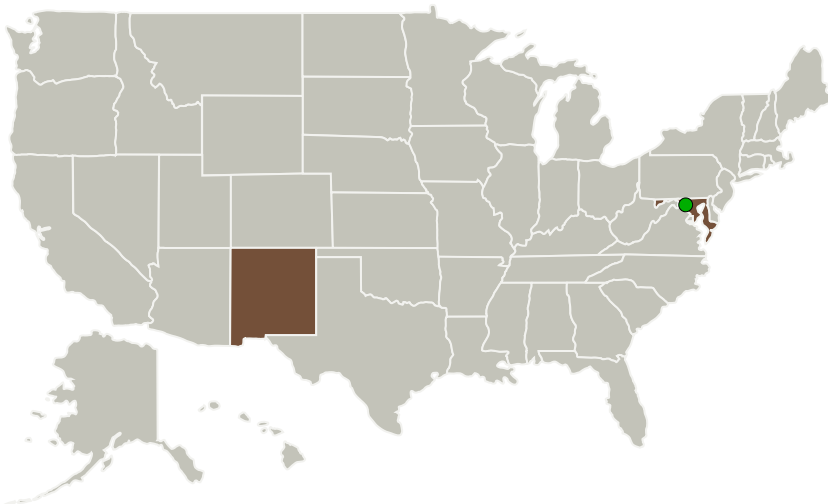
Completed Technology Project (2016 - 2016)



## Project Introduction

CubeSats currently lack adequate inertial attitude knowledge and control required for future sophisticated science missions. Boeing's Disc Resonator Gyro (DRG) integrated into a DRG-based CubeSat Inertial Reference Unit (DCIRU) in conjunction with a star tracker or sun sensor would provide the Inertial Attitude Knowledge (IAK) and position measurements needed for precision acquisition, pointing, and tracking (APT) control. Accurate attitude and position measurements provided by the DCIRU would also be required for future CubeSat constellation or formation flying missions, and for laser communication between other CubeSat's, other satellites or Earth. There are currently no small Inertial Reference Units (IRU's) suitable for CubeSats exist due to size, weight, and power constraints. The ATA/SNL Team is proposing the development of the DRG for potential integration into the DCIRU in Phase II. The highly symmetrical and scalable DRG disc standing wave design was selected by DARPA and NVESD as the only MEMS design capable of navigation grade performance. The DRG consists of a MEMS disk resonator that provides rotation sensing capable of both tactical and navigation grade precision.

## Primary U.S. Work Locations and Key Partners



DRG-based CubeSat Inertial Reference Unit (DCIRU), Phase I

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Organizations Performing Work	Role	Type	Location
Applied Technology Associates	Lead Organization	Industry	Albuquerque, New Mexico
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Mexico

## Project Transitions

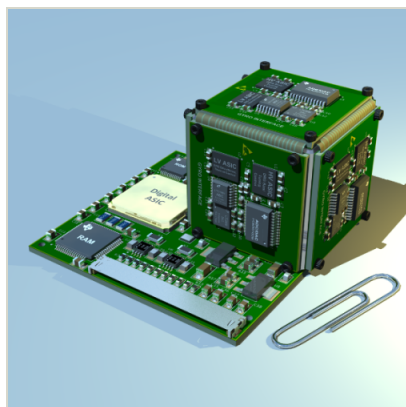
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

## Closeout Documentation:

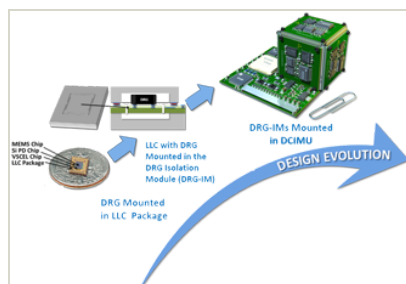
- Final Summary Chart(<https://techport.nasa.gov/file/140065>)

## Images



## Briefing Chart Image

DRG-based CubeSat Inertial Reference Unit (DCIRU), Phase I  
(<https://techport.nasa.gov/image/132443>)



## Final Summary Chart Image

DRG-based CubeSat Inertial Reference Unit (DCIRU), Phase I Project Image  
(<https://techport.nasa.gov/image/126372>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Applied Technology Associates

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

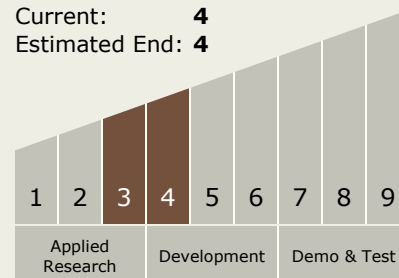
Carlos Torrez

## Principal Investigator:

Darren Laughlin

## Technology Maturity (TRL)

Start: 3  
Current: 4  
Estimated End: 4



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### Technology Areas

#### Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - └ TX17.2 Navigation Technologies
    - └ TX17.2.3 Navigation Sensors

### Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System